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EXAMINER

YAMNITZKY, MARIE ROSE

ART UNIT	PAPER NUMBER
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1774

DATE MAILED: 08/13/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/995,814

Applicant(s)

DOI ET AL.

Examiner

Marie R. Yamnitzky

Art Unit

1774

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6-9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

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1. Claims 11-17 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. See MPEP § 608.01(n). However, rather than not further treating these claims on the merits, the examiner has considered these claims as dependent from claim 8.

2. Claim 13 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification does not enable one skilled in the art to make and use a light emitting device in which a layer comprising a hole transporting compound is disposed between the cathode and the light emitting layer and is adjacent to the light emitting layer.

3. Claims 5 and 13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 is incomplete because the chemical structures of "formula (1)" and "formula (2)" are not set forth in claim 5, or in claims 1 or 2, from which claim 5 depends. (For purposes of comparing to the prior art, the examiner interprets claim 5 as if the formula (1) structure defined in claim 3 and the formula (2) structure defined in claim 4 are set forth in claim 5.)

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The layer structure of the device according to claim 13 is not clear. It is not clear how a layer comprising an electron transporting compound and a layer comprising a hole transporting compound can both be disposed between the cathode and the light emitting layer and both be adjacent the light emitting layer. It is not clear if these two layers are the same layer, or if "adjacent" does not require physical contact between the layers that are adjacent.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 2, 4 and 6-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Woo et al. (US 6,169,163 B1).

Woo et al. disclose a fluorescent polymer comprising a repeating unit of formula (1) and a repeating unit of formula (8) as defined in present claim 1, wherein Ar_1 is represented by formula (6) as defined in claim 1 wherein X_9 is $-N=CR_{24}-$ and X_{10} is $-N=$ and Ar_1 is substituted by two aryl groups as required by present claim 2. See Woo's polymer P-11 as defined in Table 4 (c. 49-50) with reference to Table 2 (c. 43-44) for the structure of monomer M-17 and Table 3 (c. 47) for the structure of monomer M-30. Monomer M-17 provides a repeating unit of present formula (1) and monomer M-30 provides a repeating unit of present formula (8). Ar_2 of the repeating unit of formula (8) is represented by formula (2') as defined in present claim 4. The amount of repeating units in polymer P-11 meets the limitations of present claims 6 and 7.

Woo et al. disclose electroluminescent devices wherein the fluorescent polymer is disposed between an anode and a cathode. For example, see c. 19, l. 42-c. 22, l. 44 and Device No. D-18 (c. 49, l. 60-c. 51, l. 43). Additional layers as required by present claims 9-13 are suggested by the prior art (presuming, in the case of claim 13, that the layer comprising a hole transporting compound should actually be disposed between the anode and the light emitting layer).

Woo et al. do not specifically disclose that polymer P-11 has a number-average molecular weight within the range set forth in present claim 1, but it would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum number-average molecular weights for Woo's fluorescent polymers based on properties affected by molecular weight. One of ordinary skill in the art would have been guided to number-average molecular weights within the presently claimed range based on Woo's teachings

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regarding preferred weight average molecular weights and preferred polydispersity (ratio of weight average molecular weight to number average molecular weight) as set forth at c. 9, l. 65-c. 10, l. 26. Woo et al. teach a preference for a number-average molecular weight that is close to the weight average molecular weight in order to improve film quality of a film formed from the polymer (e.g. see c. 1, l. 54-59).

Further with respect to present claims 14-17, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to utilize Woo's polymeric electroluminescent devices in articles which conventionally make use of electroluminescent devices.

7. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shi et al. (US 6,361,887 B1).

Shi et al. disclose fluorescent polymers comprising one or more repeating units of formula (1) and one or more repeating units of formula (8) as defined in present claim 1, wherein Ar_1 is represented by formula (4) as defined in claim 1 wherein X_5 is $-CR_{21}=CR_{22}-$ and X_6 is $-CR_{30}=$, and further represented by formula (1') as defined in claim 3. Shi et al. disclose electroluminescent devices wherein the fluorescent polymer is disposed between an anode and a cathode. For example, see the abstract, column 37, line 57-c. 38, l. 55 and the claims.

Among polymers 1-198 having the formulae shown in columns 5-38 of Shi's patent are numerous polymers comprising a repeating unit of formula (1) wherein Ar_1 is represented by formula (4) wherein X_5 is $-CR_{21}=CR_{22}-$ and R_{21} or R_{22} is an alkyl or alkoxy group. For example,

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the first naphthalene ring structure of polymer 2 is a divalent group represented by present formula (4) wherein R_{21} is an alkoxy group and the second naphthalene ring structure of polymer 2 is a divalent group represented by formula (4) wherein R_{22} is an alkoxy group.

Polymer 71 having the formula shown in columns 15-16 of Shi's patent comprises a repeating unit of formula (8) wherein Ar_2 is represented by formula (2') as defined in present claim 4.

Regarding present claim 2, aryl and heteroaryl groups are among the possible substituents for the divalent group represented by Ar_1 (the naphthalene ring structures of the formula set forth in Shi's abstract) as taught by Shi et al.

Regarding present claims 6 and 7, the prior art discloses various polymers meeting the limitations of these claims. For example, in the aforementioned polymer 71, the total number of repeating units represented by formulae (1) and (8) is 100 mol% of all repeating units, and the amount of repeating units represented by formula (1) is 50 mol% based on the total amount of repeating units represented by formulae (1) and (8).

Devices having the layer structure specified in claim 8, with claims 11 and 12 dependent therefrom, are disclosed by Shi et al. (e.g. see c. 37, l. 57- c. 38, l. 55). In the event that the layer comprising a hole transporting compound according to claim 13 as dependent from claim 8 is actually required to be between the anode and the light emitting layer, Shi et al. also disclose the layer structure of claim 13.

The only limitation of present claims 1-8 and 11-13 that is not explicitly disclosed by Shi et al. is the polystyrene reduced number-average molecular weight. Shi et al. disclose weight

average molecular weights. For example see c. 37, l. 27-31 and Table 1 in c. 54. It would have been within the level of ordinary skill of a worker in the art at the time of the invention to determine suitable and optimum number average molecular weights for Shi's fluorescent polymers based on properties affected by molecular weight.

Further with respect to present claims 9 and 10, it would have been within the level of ordinary skill in the art at the time of the invention to include auxiliary layers based on the properties afforded by those layers. The layers required by claims 9 and 10 are suggested by Shi et al. (e.g. see c. 38, l. 32-43).

Further with respect to present claims 14-17, it would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to utilize Shi's polymeric electroluminescent devices in articles which conventionally make use of electroluminescent devices.

8. Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Noguchi et al. (EP 1 043 382 A2).

See the whole document, especially the claims and paragraphs [0017]-[0021].

Noguchi et al. suggest polymeric fluorescent substances within the scope of the present claims.

The fourth and seventh formulae following "[Chemical formulae 9]" in paragraph [0019] represent divalent groups represented by present formulae (6) and (7), respectively. The first, second, fifth and sixth formulae following "[Chemical formulae 10]" represent divalent groups

represented by present formulae (5), (2), (4) and (3), respectively. The fifth and sixth formulae following "[Chemical formulae 13]" represent divalent groups represented by present formulae (3) and (4), respectively.

The second, third, fifth, sixth, eighth, ninth and tenth formulae following "[Chemical formulae 15]", the first, third, seventh, eighth and tenth formulae following "[Chemical formulae 16]", and the sixth-fifteenth formulae following "[Chemical formulae 21]" also represent divalent groups within the scope of Ar_1 as defined in present claim 1.

The fifth formula following "[Chemical formulae 10]" further represents a divalent group represented by formula (1') as defined in present claim 3. The seventh formula following "[Chemical formulae 13]" represents a divalent group represented by formula (2') as defined in present claim 4.

Noguchi et al. suggest the use of these polymeric fluorescent substances in polymer light emitting devices having the layer structures required by present claims 8-13 (presuming, in the case of claim 13, that the layer comprising a hole transporting compound should be between the anode and the light emitting layer rather than between the cathode and the light emitting layer). Noguchi et al. further suggest the use of polymer light emitting devices comprising these polymeric fluorescent substances in articles as claimed in present claims 14-17.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time of the invention to make various polymeric fluorescent substances suggested by Noguchi et al. and to utilize the polymeric fluorescent substances for the suggested purposes.

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9. Miscellaneous:

The examiner suggests inserting --one of-- after "by" in the sixth line of claim 1.

In the second line after formula (7) in claim 1, "-CO," should be -- -CO-,--.

In the seventh line after formula (7) in claim 1, "arylalkinyl" should be --arylalkynyl--.

In the first line after formula (8) in claim 1, "In" should be --in--.

Claim 1 sets forth a formula (8) that contains a subscript "n" but defines "m" rather than "n". Either the subscript "n" should be --m-- in formula (8), or "m" should be changed to --n-- in the last line of the claim.

In the eighth line after the formula in claim 3, "However" should be --however--.

In the fourth line of claim 9, "an" should be --a--.

10. Any inquiry concerning this communication should be directed to Marie R. Yamnitzky at telephone number (703) 308-4413. The examiner works a flexible schedule but can generally be reached at this number from 6:30 a.m. to 4:00 p.m. Monday, Tuesday, Thursday and Friday, and every other Wednesday from 6:30 a.m. to 3:00 p.m.

The current fax numbers for Art Unit 1774 are (703) 872-9311 for official after final faxes and (703) 872-9310 or (703) 305-5408 for all other official faxes. (Unofficial faxes to be sent directly to examiner Yamnitzky can be sent to (703) 872-9041.)

MRY
August 11, 2003



MARIE YAMNITZKY
PRIMARY EXAMINER

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